INFECTION DISEASE

Duane L. Pierson, Ph.D.

Biomedical Operations and Research Branch

NASA Johnson Space Center
Long Duration Space Missions

Major Concern:

- Recurrent outbreaks of Infectious Diseases that jeopardize the health, safety and/or performance of crewmembers.

Preventative Measures

- Preflight Microbiological Screening
  - Immune status (viral and bacterial)
  - Microbiological examination for bacteria/parasite pathogens

- Preflight Quarantine
  - Prevent contact with ill personnel
  - Covers most viral incubation periods

- Review of Payloads/Experiments
  - Limit risk of zoonotic diseases

- Environmental Surveillance
  - Air, water, food, and surfaces
Antarctic Environment

- **NASA Relevance**
  - May allow additional insight into the effect of stressors on the human immune system.
  - Provide excellent model for more refined epidemiological studies.
  - Provide additional information on persistent viral infections (viral reactivation)
Proposed Studies

- Measure physical parameters of environment (e.g., temperature, relative humidity, ventilation rate, make-up air, etc.)

- Measure Airborne Contaminants
  - Bacteria/Fungi
  - Volatile organic compounds
  - Gas composition (e.g., CO, CO$_2$, etc.)

- Measure Effects on Immune System
  - Humoral
    - immunoglobulin and antibody levels
    - antibody formation
    - immunoglobulin and antibody levels in external secretions
  - Cell Mediated
    - PMN number and function
    - macrophage function
    - lymphocyte proliferative response
    - lymphocyte phenotype numbers
    - delayed hypersensitivity
• HSV Shedding
  • Collect oral secretions before, during, and after isolation

• Refined Epidemiological Studies
  • Collect nose/throat swabs (weekly) before, during, and after isolation
  • Collect serum samples monthly
  • Utilize latest techniques for storage/handling of specimens
  • Utilize latest technology for viral/serology studies

• Institute a case control study for occurrence of all apparent infectious disease; collect appropriate specimens.
Questions

1. What is the laboratory capability?

2. Are there good and complete medical data on symptoms and illnesses for repeated years at the pole? If so, does it reveal anything other than URI?

3. What has been done with monitoring of normal flora? Have there been no cases of staphylococcal or streptococcal disease?

4. How do they prepare their food?

5. How are gastro-intestinal upsets treated? Are causative agents identified?

6. What type of viral/microbiological studies are performed before they go to Antarctica?